AMERICAN MUSEUM NOVITATES

Number 998 Published by THE AMERICAN MUSEUM OF NATURAL HISTORY New York City June 7, 1938

NOTES ON CARANGIN FISHES

III.—ON *CARANX SEXFASCIATUS* QUOY AND GAIMARD

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The form of the genus *Caranx* with completely scaled breast, most closely related to the *C. hippos–ignobilis* group wherein the breast has only a central patch of scales, is at present generally referred to *Caranx sexfasciatus* Quoy and Gaimard. It has banded young similar to the type figure thereof; and this identification is reasonably satisfactory, and accepted by the writer. Weber and de Beaufort, 1931, 'Fishes Indo- Aust. Archipel.,' VI, pp. 243 to 246, give an extensive synonymy of this species in the Indo-Pacific, in which the writer concurs in the main. They do not recognize its variations or races, including what seems to be the best marked of these (*C. s. elacate*) without comment.

Caranx sexfasciatus is then a circumtropical form characterized by a curved front profile of the head, much enlarged scutes on the peduncle, and deep-bodied banded young like the *hippos* group. Like these it has differentiated canines in the front of the jaws, but smaller, sometimes quite small. I take the view that it is as or more closely related to this group than to any other member of the genus, and that hence a distinct genus cannot advantageously be based on their scaleless breast with central patch of scales, which is sometimes done.

Caranx sexfasciatus differs from the *hippos–ignobilis* group in the fully scaled breast and somewhat more abrupt and relatively shorter curved part of the lateral line. It loses any comparable black opercular blotch (conspicuous in *hippos*) at an early age, but frequently develops a small black fleck about the very upper end of the gill-slit. The end of the lobe of the soft dorsal almost invariably becomes black or dusky, and there is no corresponding mark on the anal though this fin as a whole may be dark colored. The scutes or keels commonly become darker than the area above and below and show as a dark stripe. It is a rather easy form to recognize if one is thoroughly familiar with its characters, very easy to confuse with a variety of

other forms if one is not, frequently mis-identified, and has been frequently named.

RACES

Caranx sexfasciatus varies more or less geographically over its wide range as is shown by material in The American Museum of Natural History, mostly into poorly defined races, in one case at least, into what may be a tenable species. The race with which I am most familiar is the "horse-eyed jack" of the Bahamas, abundant in Bermuda, not plentiful in Florida and uncommon on our coast north of there, seemingly a fish of the West Indian fauna, more or less replaced on continental North American shores by related *Caranx hippos*. It is generally known as *Caranx latus* Agassiz (1829) with type locality Brazil; and *Caranx fallax* Cuvier and Valenciennes (1833), Antilles, Brazil,—Poey (1875), Cuba, is also available for it. It is characterized by great depth of body and large eye at moderate sizes, holding both these characters of youth longer than most members of the genus do.[1] At a large size it becomes more slender, however, one of some 950 mm. having depth about 3.4.[2] In 11 specimens from Porto Rico and Nassau the dorsal soft rays are 21, anal 16 to 18 (average 16.7).

A specimen of presumably typical *C. s. sexfasciatus* from New Guinea (Archbold collections) 130 mm. in standard length, fits into our West Indian series except that there are but 20 dorsal and 16 anal soft rays, few scutes (31), and its canines are perhaps a little more prominent. Weber and de Beaufort, presumably from East Indian material, give dorsal soft rays as 19 to 22; anal, 15 to 17; scutes, 30 to 33.

Six specimens of 82 to 154 mm. from Rio de Janeiro, Brazil (Morden collections) have dorsal soft rays 20 to 23 (average 21.2), anal 16 to 17 (average 16.5). They fit the West Indian series except that the eye becomes too small (4 in head) at from 128 to 154 mm. standard length. At Rio this seems to be the common shore *Caranx*, probably fitting a somewhat different ecological niche from the West Indian fish. If we wish to differentiate it, it may stand as *Caranx sexfasciatus latus* Agassiz, the latter as *Caranx sexfasciatus fallax* Cuvier and Valenciennes. According to Meek and Hildebrand's description this species on the Atlantic coast of Panama matches *fallax* rather than *latus* though perhaps somewhat intermediate.

[1] Nichols, 1937, Amer. Mus. Novitates, No. 967, p. 3.
[2] Nichols, 1912, Bull. Amer. Mus. Nat. Hist., XXI, p. 186.

Two specimens of 84 and 115 mm. standard length from Ecuador (Morden collections) have the eye, respectively, 3.5, 3.8; dorsal soft rays, 18, 20; anal, 15, 15; scutes, 28, 31. These are presumably referable to *Caranx sexfasciatus marginatus* Gill (1866), characterized by a minimum number of fin rays; in these specimens differing but slightly from *C. s. latus* (above), that is in this character and in fewer scutes. The scutes in a combined series of 17 *latus* and *fallax* (above) vary from 28 to 38, but average 33.3 1/2.

Meek and Hildebrand, 1925, 'Fishes Panama,' Field Mus. Nat. Hist., Zool., XV(pt. 2), p. 356, give dorsal soft rays as 19 to 20; anal, 15 to 17; scutes, 25 to 30. The difference of shape figured (Pl. XXVI) between this and a specimen of the Atlantic form is largely an age difference. The diagnostic enlarged peduncular scutes do not show as they should in their figure of the larger specimen (*marginatus*).

Five specimens of 44 to 335 mm. from the Hawaiian Islands (Morden collections) are notable for the particularly great breadth of scutes on the peduncle, and comparatively few scutes, 25 to 29 (average 26.2). Ordinarily somewhat fewer scutes are appreciable in smaller than in larger fish, and the relative breadth of the peduncular scutes increases with size. In this form the latter tendency very likely crowds out some of the smaller scutes, keeping the total number consistently low. The dorsal soft rays are 19 to 20 (average 19.4), anal 16 to 17 (average 16.2). The eye remains as large as that of *fallax*, at least to a standard length over 100 mm., but over 100 mm. the depth falls off more rapidly, the fish is more slender. This is *Caranx sexfasciatus elacate* (Jordan and Evermann, April, 1903), of which *Carangus rhabdotus* Jenkins (September, 1903) is presumably the young. The type of *elacate*, some 675 mm. in (? total) length, had dorsal soft rays, 19; anal, 16; scutes, 28; depth in length, 3.4; eye in head, 4.5.

Applying this evidence, such as it is, to *Caranx sexfasciatus* considered one widely ranging variable form, we have slightly more fin rays and scutes in the Atlantic; the eye less large (decreasing more normally with growth of fish) on coasts of Brazil and Ecuador; body less deep (depth decreasing more normally), and scutes larger (posteriorly) and fewer, about the isolated Hawaiian Islands. West Indian *fallax* is barely distinguishable from East Indian *sexfasciatus*, and differs appreciably in habitus from Brazilian *latus*, which averages higher fin and scute counts than West Coast *marginatus*. All

these differ so little as to be questionably recognizable, but Hawaiian *elacate* is more distinct.

A tentative key to differentiate specimens between 100 and 200 mm. standard length might read:

(1) Scutes, 25 to 30; depth, 2.7 or more in length; eye, 3.7 or less in head; average dorsal and anal soft rays, 19.4, 16.2 ..... *elacate.*
Scutes, 30 to 38; depth, 2.7 or less in length ..... See (2).
(2) Eye (at 125 or more mm.), 3.8 or more in head ..... See (3).
Eye, 3.7 or less in head ..... See (4).
(3) Average dorsal soft rays, 21.2; anal, 16.5; scutes, 34.7 ..... *latus.*
Average dorsal soft rays, 19; anal, 15; scutes, 29.5 ..... *marginatus.*
(4) Average dorsal soft rays, 21; anal, 16.7; scutes, 32.6 ..... *fallax.*
Dorsal soft rays about 20; anal, 16; scutes, 31 ..... *sexfasciatus.*

COLOR

I have noted that in a mixed school of moderate-sized (perhaps 100 to 300 mm.) *Caranx* swimming in an aquarium tank (Florida, February, 1921), "the big eye of *latus* [*C. s. fallax*] was noticeable, as also its yellow, dark rimmed caudal, and black dorsal lobe."

Detailed color notes were made on a specimen of about 275 mm. standard length when fresh from the Nassau market as follows: "Dark gray above, silvery on sides, white on belly; dull greenish and slightly brassy reflections on back and sides, bluish, pinkish and greenish ones on lower parts. Iris silvery, tinged with reddish gold and with a narrow reddish inner ring; an obscure dusky blotch on margin of opercle bordered in front with brassy, and a small dusky mark at extreme upper end of gill opening; tip of scutes dusky, making a rather conspicuous dusky streak. Spinous dorsal pale; soft dorsal light gray; caudal gray tinged with yellow; end of dorsal lobe and margin of caudal, which were probably blackish, frayed off. Anal gray, anterior rays, distal end of lobe, and very narrow basal and marginal line, whitish; ventrals white; pectoral pale, with a clouded dusky blotch at base below the center. Tip of lower jaw dusky. The blotch on gill-cover and base of pectoral less bold and different in character and position from corresponding marks in *hippos.*" A specimen of about 143 mm. had "caudal grayish yellow with black margin; soft dorsal broadly tipped with black."

According to Weber and de Beaufort *C.* [*s.*] *sexfasciatus* has "Colour in young bluish, later brownish above, lighter below; in young till about 80 to 100 mm. length crossed by 5–7 broad dark bands, disappearing later on, the first crossing the eye; in young the

spinous dorsal and the lobe of the soft dorsal blackish, all other fins yellowish, in adult the dorsal, anal and caudal more or less blackish, the paired fins light; . . . Length till about 1000 mm."

Specimens of *C. s. elacate* of 45 to 90 mm. standard length are (when freshly preserved) rather dark olive above, more or less silvery below, the dark bars on the sides becoming broader and more indistinct in the larger separated by narrow pale interspaces, the end of the dorsal lobe and sometimes the margin of the fin dusky or blackish, the caudal becoming gray darkening toward its margin. At a corresponding size their color is quite unlike that of *C. melampygus*, the related Hawaiian form with which they might be confused. A specimen of the latter of 84 mm. is bright silvery above and below, tips of soft dorsal and anal lobes slightly dusky. A *C. s. elacate* of 116 mm. has completely lost the bars and is brownish above, silvery below, the line of the peduncular keels slightly dusky, the anal still pale. One of 335 mm. (in alcohol some time) is lead color above, the sides and below dull, rather brassy yellow; the scutes dusky gray; dorsal, caudal, and anal rather dark, the lobe of the dorsal darker. The type, a larger fish of 500 or 600 or more mm. (whether length standard or total not stated) is described by Jordan and Evermann as olivaceous, paler on the lower sides and white on the belly, with vertical fins all more or less dark, and is figured with blackish scutes.

Two (freshly preserved) *C. s. marginatus* of 84 and 115 mm. had end of dorsal lobe black, margin of fin and margin of caudal within the fork somewhat dusky, and the anal pale. The smaller had 5 dark bands on the back and sides behind the head and was silvery below, the larger was olive-gray above, silver-white below.

According to Meek and Hildebrand this form is bluish above, sides silvery, young with 5 or 6 dark cross-bars, and they figure a specimen 105 mm. long (? total) with the bars distinct. Bars are presumably lost at about 100 mm. or a little more standard length in this form and in *elacate*. Jordan and Evermann (1896, Bull. U. S. Nat. Mus., XLVII, pt. I, p. 923) give the colors as bluish, sides golden.

Specimens of *C. s. latus* of 82 and 88 mm. standard length from Rio (freshly preserved) had about 5 broad dark bands indicated on the upper sides, separated by narrow paler interspaces, in another of 89 mm. there were only faint traces of bands, and 3 of 113 to 154 mm.

lacked them altogether and were paler, greenish gray above, silvery white below. There was a slight spot in the upper notch of the gill cleft in one of 128 mm., more distinct in the largest of 154 mm. which was also slightly dusky along the peduncular keels. All had a sharp black end to the dorsal lobe and slight dusky edging in the caudal angle.